

#5

GUIDED NOTES: Geometric Modeling

EX1. Determine the surface area of a cylindrical glass with a height of 6 inches and a diameter of 4 inches.



cylinder

$$SA: 2\pi rh + 2\pi r^2$$

↑ takes into account top & bottom

SA: Want the outside of the glass → want the bottom (only want 1)

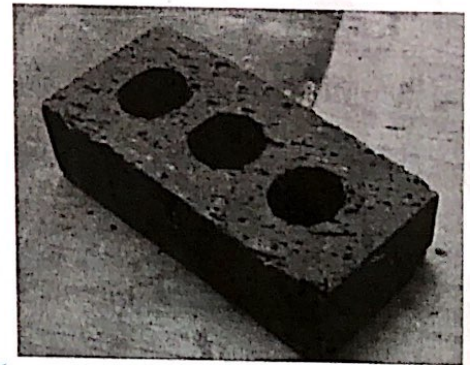
$$SA: 2\pi rh + \pi r^2$$

$$= 2\pi(2)(6) + \pi(2)^2$$

$$= 87.96 \text{ inches}^2$$

has SA units²

EX2. A brick has a length of 10 inches, a width of 4 inches, and a height of 2 inches. There are three identical cylinders with a radius of 1 inch missing out of the middle of the brick. Determine the volume of the brick.



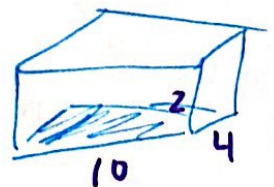
Goal: *Volume of Brick (Rectangular Prism)

$$V = Bh$$

↑ area of Base

* Find volume of cylinder Subtract it! (from Rectangular Prism)

Brick Volume: $(10 \times 4) \times 2 = 80 \text{ in}^3$



Cylinder Volume:

$$\pi r^2 h = \pi(1)^2(2) = 6.28 \text{ in}^3$$

How many? 3

$$\begin{array}{r} 6.28 \text{ in}^3 \\ \times 3 \\ \hline 18.84 \text{ in}^3 \end{array}$$

Volume has units³

Brick Final Volume:

$$80 \text{ in}^3 - 18.84 \text{ in}^3 =$$

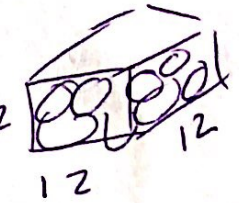
$$61.16 \text{ in}^3$$

EX3. Eight wooden spheres, each with a radius of 3 inches, are packed snugly into a square box that is 12 inches on one side. The remaining space is filled with packing beads. What is the volume occupied by the packing beads?

Volume Box: $(12 \times 12) \times 12 = 1728 \text{ in}^3$

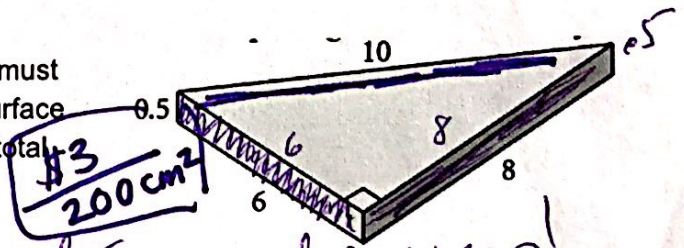
Volume Sphere: $\frac{4}{3} \pi r^3 = \frac{4}{3} \pi (3)^3 = 113.10 \text{ in}^3$

for all 8 spheres. $\rightarrow \frac{113.10 \times 8}{904.78 \text{ in}^3}$



Volume Remaining $1728 - 904.78 = 823.224 \text{ in}^3$

EX4. You are producing 500 of these metal wedges, and you must electroplate them with a thin layer of high-conducting silver (surface area). The measurements shown are in centimeters. Find the total cost for silver, if silver plating costs \$3 for every 200 square centimeters.



SA: find the area of all sides \rightarrow add it up!

SA = $(6 \times 0.5) + (8 \times 0.5) + (10 \times 0.5) + 2 \left(\frac{1}{2} (6 \times 8) \right)$

$3 + 4 + 5 + 2(24)$

$3 + 4 + 5 + 48 = 60 \text{ cm}^2$

$\frac{60 \times 500}{30,000 \text{ cm}^2}$

Cost: $30,000 \text{ cm}^2 \times \frac{\$3}{200 \text{ cm}^2} = \$450$

$30,000 / 200 = 150 \times \$3 = \$450$

I need 500.